A Situational Approach and Intelligent Tool for Collaborative Requirements Elicitation

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A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy in Computing Sciences

University of Technology, Sydney

2007

CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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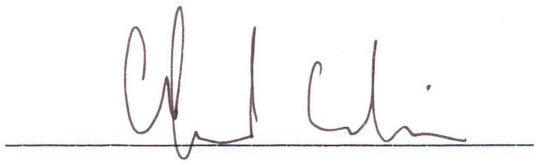

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ACKNOWLEDGEMENTS

First and foremost, I would like to thank my principal supervisor, Associate Professor Didar Zowghi, for her wisdom, guidance, and support, throughout my candidature. I would also like to thank my Cotutelle supervisor in France, Professor Abd-El-Kader Sahraoui (LAAS-CNRS and IUT Blagnac), and my co-supervisors Dr Vincenzo Gervasi (University of Pisa) and Dr Yusuf Pisan, for the many discussions, valuable advice, and constant encouragement.

A big thank you goes to my colleagues Norazlin Yusop, Nurmuliani, Dr Samiaji Sarosa, and Dr Mahmood Niazi of the Requirements Engineering group at UTS FIT, and Mohamad Hani El Jamal, Mourad Messaadia, and Adel Ouardani, and Nabil Sadou of the Systems Engineering and Integration group at LAAS-CNRS, who made my candidature so enjoyable and rewarding. This thesis would simply not have been possible without the ongoing support and encouragement of my parents Ray and Ruth Coulin, my brother Jarrod Coulin, and my friends Daniel McCormack, Anshu Jayaweera, and Ranga Welaratne. To all of you I am eternally grateful.

A special thanks goes to Professor Alan Davis and Professor Donald Gause for the always insightful and entertaining conversations. And finally, I would like to thank all the people who generously gave their time to participate in the expert interviews, novice questionnaire, case studies, and experiments.

The research presented in this thesis was conducted as part of a Cotutelle agreement between the University of Technology, Sydney and Paul Sabatier University. It was sponsored by the Insearch Doctoral Award Scholarship and the French Embassy in Australia / Australian Academy of Science Cotutelle Grant.

PUBLICATIONS

This thesis includes some parts of the following publications:

Coulin, C & Zowghi, D 2003, 'Agent-Based Support for Requirements Elicitation', ESEC/FSE International Workshop on Intelligent Technologies in Software Engineering, Helsinki, Finland, September 1.

Coulin, C & Zowghi D 2004, 'GONDOLA: An interactive computer game-based teaching and learning environment for Requirements Engineering', Requirements Engineering: Foundation for Software Quality, Riga, Latvia, June 7-8.

Coulin, C 2004, 'A Novel and Collaborative Approach to Requirements Elicitation with Process Guidelines and Intelligent Tool Support', International Conference on Requirements Engineering – Doctoral Consortium, Kyoto, Japan, September 7.

Coulin, C & Zowghi, D 2005, 'Requirements Elicitation for Complex Systems: Theory and Practice', *Requirements Elicitation in Requirements Engineering for Socio-Technical Systems*, Maté, JL & Silva, A (Eds.), Idea Group, USA.

Zowghi, D & Coulin, C 2005, 'Requirements Elicitation: A Survey of Techniques, Approaches, and Tools', *Engineering and Managing Software Requirements*, Aurum, A & Wohlin, C (Eds.), Springer, USA.

Coulin, C, Sahraoui, AEK & Zowghi, D 2005, 'Towards a Collaborative and Combinational Approach to Requirements Elicitation within a Systems Engineering Framework', International Conference on Systems Engineering, Las Vegas, USA, August 16-18.

Coulin, C & Sahraoui, AEK 2005, 'A Meta-Model Based Guided Approach to Collaborative Requirements Elicitation for Software Systems Development', International Conference on Software and Systems Engineering and their Applications, Paris, France, November 29 – December 1.

Coulin, C, Zowghi, D & Sahraoui, AEK 2005, 'A Workshop-Centric Situational Approach for Requirements Elicitation', International Workshop on Situational Requirements Engineering Processes, Paris, France, August 29-30.

Coulin, C & Zowghi, D 2005, 'What Do Experts Think About Elicitation? - A State of Practice Survey', Australian Workshop on Requirements Engineering, Melbourne, Australia, November 22.

Coulin, C, Zowghi, D & Sahraoui, AEK 2006, 'A Situational Method Engineering Approach to Requirements Elicitation Workshops in the Software Development Process', *Software Process: Improvement and Practice*, vol. 11, pp. 451-64.

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ABSTRACT

Requirements elicitation is a fundamental part of the software development process, and widely regarded as one of its more challenging activities. Many of the current techniques, approaches, and tools are either unknown or too complex for novices, resulting in a significant gap between requirements elicitation theory and practice. Just as important, is the current gap between expert and novice analysts, which can be attributed to the extensive skill set and range of experiences that is often required to successfully conduct this difficult yet vital activity. Consequently, in this research we investigated both the state of the art and the state of practice, in order to develop and evaluate an approach and a tool to support novice analysts elicit requirements for software systems in a workshop environment.

The first stage of the research was a literature review, which involved a thorough review and critical analysis of existing theory on and around the area of requirements elicitation. This was followed by a survey of practice, which consisted of in-depth interviews with experts, and an online questionnaire for novices, used to elicit approach guidelines and tool features. The OUTSET approach was then designed, and the supporting tool MUSTER constructed. The final stage of the research involved the evaluation of the approach and tool through a case study, case study experiment, and formal experiment.

The empirical evaluations conducted showed that using the MUSTER tool improved the overall effectiveness of the requirements elicitation process, while the underlying OUTSET approach improved the overall efficiency. It was also shown that the combination of the approach and tool provided a collective system that was both useful and useable. In the experiment conducted, the MUSTER tool received more than three times the score of the manual tool for effectiveness, and more than double for usability. In addition, the combination of research methods used, and the successful application of Situational Method Engineering (SME) and Group Support System (GSS) principles for the approach and tool respectively, was both novel and unique from any other previous work on requirements elicitation.